

## INNOVATIVE TECHNOLOGIES

## Global Language for Global Problems

Although—or perhaps because—environmental health concerns affect every person on the planet, scientists often suffer a modern-day Tower of Babel syndrome, using a diversity of terms in all different languages to describe the same ideas. So European, American, and international agencies have decided to collaborate on the development of a global multilingual environmental thesaurus to eliminate translation time and create easier communication between international parties. Representatives from the Consiglio Nazionale delle Ricerche (Italy's national research council), the European Environment Agency (EEA), the U.S. Environmental Protection Agency (EPA), and the United Nations Environment Programme (UNEP) met in January 2000

in an effort to begin breaking down linguistic barriers hampering environmental information exchange between nations. These agencies expect other partners to join in the creation of the global environmental language thesaurus.

The focus of this international initiative is to agree on a common vocabulary for indexing data contained in environmental information systems, Internet sites, databases, and other electronic resources according to a mutually agreed upon set of key words. A common vocabulary, according to the team, will assist in the development of environmental information systems and expedite the retrieval of such information from electronic resources through information searches and content cataloging by librarians, researchers, database developers, translators, policy developers, and the public. A common vocabulary may also help to expand international research partnerships in environmental health by facilitating communication. Domingo Jimenez-Beltran, executive director of the

EEA, said in a 7 February 2000 press release that this initiative “will increase access to timely, relevant, and reliable information on the environment by a wide range of language groups that are currently impeded by linguistic barriers.”

The consortium will begin the process by looking at *Envoc: Multilingual Thesaurus of Environmental Terms*, which was published in 1997 by the EEA and UNEP. The group plans to combine this tool with the EEA's *Generalized Multilingual Environmental Thesaurus* and supplement the resulting document with terms from other sources such as the EPA's Terminology Reference System and the Asia-Pacific Economic Cooperation's thesaurus. Currently, the *Envoc* thesaurus uses 12 languages, and the new thesaurus is expected to incorporate even more. A plan for the global thesaurus, anticipated to be accessible on the Internet, on CD-ROM, and in print, is expected by September 2000. —Lindsey A. Greene

## NATURAL DISASTERS

## An Eruption of Silicosis

Volcanoes may pose long-term health hazards, according to an article in the 19 February 1999 issue of *Science* by researchers studying the aftermath of the 1997 eruption of the Soufriere Hills volcano in Montserrat. “Ash is an often neglected hazard, particularly the longer-term effects,” says coauthor Ray Dupree, a physicist at the University of Warwick in Coventry, United Kingdom. According to the researchers, certain types of eruptions—like that of Soufriere Hills—may be potentially more hazardous than others in terms of the ash produced.

Scientists have long known that volcanic ash creates minor health problems such as eye irritation and exacerbates existing problems such as asthma. But the study, led by community medicine specialist Peter Baxter of the University of Cambridge, reveals that certain types of volcanic ash may create long-term problems such as silicosis, an irreversible scarring disease of the lungs that occurs over long periods of exposure. The study is the first to link a technical mechanism of eruption to a specific health hazard, and is also one of the most detailed studies to date to quantify and define the ratio of silica minerals in volcanic ash versus glass and other particles.

In the ash generated at Soufriere Hills by pyroclastic flows—mixtures of volcanic ash and gases that hug the ground and flow down valleys—the team found high levels of a form of crystalline silica called cristobalite, which is known to cause silicosis. After assaying the ash around the island, the team found that the majority of particles under 10 micrometers in diameter contained 10–24% crystalline silica, mainly cristobalite, by weight. Moreover, large amounts of the particles were less than 3 micrometers in diameter—small enough to penetrate deep into the lungs.

The team also found that the hazard is increased during long-lived eruptions, which spew ash over years or decades. Dome eruptions, in which a mass of magma builds up over the volcano's vent,

generating myriad pyroclastic flows and ash plumes, also increase the hazard because they produce more fine ash and more fine crystalline silica. “The amount of fine respirable ash generated in such eruptions and the content of crystalline silica in the ash are significantly increased by crushing processes and transport processes in the pyroclastic flows formed by dome [eruptions],” explains Bristol University geologist and volcanologist Steve Sparks, a study coauthor. In contrast, the 1980 eruption of Mount St. Helens in Washington State produced short-lived ashfalls with vastly fewer fine particles containing only 4% cristobalite by weight.



**Hazardous ash.** A less immediate but still hazardous effect of exposure to volcanic ash is the lung-scarring disease silicosis.

The team measured suspended particle concentrations in areas where there was human activity and found that such activity is an important factor in resuspending ash and increasing exposure of populations, Sparks says. Reoccupation of some of the devastated and evacuated areas was delayed because of the poor air quality conditions caused by the ash, which had to be removed before people were allowed back.

Laboratory experiments indicate that cristobalite can be more toxic than quartz, a known cause of silicosis in workers with long-term exposure to silica dusts, but the reason for cristobalite's

increased toxicity is not known, says Sparks. Cristobalite toxicity varies greatly according to the age of the stone, heating, and other treatments, he adds.

Although dome eruptions are fairly common worldwide, the study findings may not apply to domes of other volcanoes, especially those of different chemical compositions, which may produce different minerals in varying percentages. Plus, other hazards associated with the creation of volcanic clouds, including hydrochloric and hydrofluoric acid gases and sulfuric acid particles, are largely unstudied.

Indeed, much work remains to determine the specific long-term health risks volcanoes pose to humans. Even though follow-up studies such as a chest X ray survey of islanders most exposed to ash are being undertaken, getting hard data on human exposure and health effects may take years. “Conditions like silicosis take very long times to develop,” Sparks says. —Julie Wakefield